

Lab Exercise 2. Variables, assignment, types and operators

1. What is a Python comment? How do you indicate a comment? What purpose does it serve?

2. What is a namespace in Python?

3. Whitespace:

(a) When does whitespace matter?

(b) When does whitespace not matter?

4. Mixed operations:

(a) What type results when you divide an integer by a float? A float by an integer?

(b) Explain why that resulting type makes sense (as opposed to some other type).

5. Consider integer values of a , b , and c and the expression $(a + b) * c$. In mathematics, we can substitute square brackets, $[]$, or curly braces, $\{ \}$, for parentheses, $()$. Is that same substitution valid in Python? Try it.

6. Which of the following are acceptable variable names for Python?

(a) xyzzzy

(b) 2ndVar

(c) rich&bill

(d) long name

(e) good2go

7. Give the values printed by the following program for each of the labeled lines.

```
int_a = 27
int_b = 5
int_a = 6
print(int_a) # Line 1
print(int_b + 5) # Line 2
print(int_b) # Line 3
```

(a) What is printed by Line 1?

(b) What is printed by Line 2?

(c) What is printed by Line 3?

8. Give the values printed by the following program for each of the labeled lines, and answer the associated questions.

```
a_float = 2.5
a_int = 7
b_int = 6
print(a_int / b_int) # Line 1
print(a_int // a_float) # Line 2
print(a_int % b_int) # Line 3
print(int(a_float)) # Line 4
print(float(a_int)) # Line 5
```

- (a) Line 1: What is printed? What is its type?
- (b) Line 2: What is printed? What is its type?
- (c) Line 3: What is printed? What is its type?
- (d) Line 4: What is printed? What is its type?
- (e) Line 5: What is printed? What is its type?

9. Give the values printed by the following program for each of the labeled lines.

```
a_int = 10
b_int = 3
c_int = 2
print(a_int + b_int * c_int) # Line 1
print( (a_int + b_int) * c_int ) # Line 2
print(b_int ** c_int) # Line 3
```

- (a) What is printed by Line 1?
- (b) What is printed by Line 2?
- (c) What is printed by Line 3?

10. Change the program below to calculate and print the area of a rectangle instead.

```
from math import pi
r = 12
area = pi * r ** 2
print("The area of a circle with radius", r, "is", area)
```

11. Write a Python program that prompts for a number. Take that number, add 2, multiply by 3, subtract 6, and divide by 3. You should get the number you started with.

12. Assignment:

```
my_int = 5
my_int = my_int + 3
print(my_int)
```

(a) If you execute the three lines of code, what will be printed? Explain your answer using the rules of assignment.

(b) Rewrite `my_int = my_int + 3` using the `+=` symbol.

13. Assignment:

```
my_var1 = 7.0
my_var2 = 5
print(my_var1 % my_var2)
```

If you execute these three lines of code, what will be printed?

14. Prompt for input and then print the input as a string, an integer, and a float-point value. What values can you input and print without errors being generated?

15. Consider the expression `(a + b) * c`, but with string values for `a`, `b`, and `c`. Enter that into the Python shell. What happens? Why?

16. (Integer operators) One way to determine whether an integer is even is to divide the number by 2 and check the remainder. Write a three-line program that prompts for a number, converts the input to an integer, and prints a 0 when the number is even and a 1 when the number is odd.

17. Body mass index (BMI) is a number calculated from a person's weight and height. According to the Centers for Disease Control and Prevention, the BMI is a fairly reliable indicator of body fatness for most people. BMI does not measure body fat directly, but research has shown that BMI correlates to direct measures of body fat, such as underwater weighing and dual-energy X-ray absorptiometry. The formula for BMI is

$$\text{weight} / \text{height}^2$$

where weight is in kilograms and height in meters.

- (a) Write a program that prompts for metric weight and height and outputs the BMI.
- (b) Write a program that prompts for weight in pounds and height in inches, converts the values to metric, and then calculates the BMI.